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Relationship between socio-economic status and achievement in mathematics for three hundred eighth-grade children in Modesto, California

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RELATIONSHIP BETWEEN SOCIO-ECONOMIC STATUS AND ACHIEVEMENT IN MATHEMATICS FOR THREE HUNDRED EIGHTH-GRADE CHILDREN IN MODESTO, CALIFORNIA

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CHAPTER I

INTRODUCTION

The students attending the Mark Twain Junior High School, a seventh and eighth-grade plant operating as a part of the Modesto City Elementary School District, come from what appears to be a wide range of socio-economic backgrounds. Many children, whose parents annually travel hundreds of miles in order to be present where agricultural products ripen in the San Joaquin Valley, and who are accustomed to living in sub-standard housing, study and learn with others who come from homes where the occupations of parents range from unskilled labor through the various professions.

Ability groups classed as above average in this school contain fewer children from the low socio-economic housing area than do those listed as below average. This information is indicated in the card files where addresses and standardized test scores in intelligence, reading, and mathematics are recorded. Classroom teachers notice such signs of poor finances as patched clothing, infrequent haircuts, and worn shoes in the low ability groups more often than in the faster classes. Such observations were the basis for the thesis which prompted this study,

namely, that children of low socio-economic status attending Mark Twain School will, as a group, tend to perform less well in mathematics than those who come from higher socio-economic backgrounds.

Achievement in mathematics was selected as the factor with which to correlate socio-economic status because fewer studies have been made in this field (as seen by a review of the literature) than in those of reading and intelligence, and because the investigator, a teacher of mathematics at the time the project was begun, was particularly interested in that subject.

The product-moment method of calculating a coefficient of correlation was chosen as the most suitable means for making the comparison.[1] The Sims Score Card for Socio-Economic Status was used in determining the socio-economic status of the group.[2] Achievement in mathematics was taken from scores obtained in using the Metropolitan Achievement Test.[3] Three hundred children attending the

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[1]Henry E. Garrett, Statistics in Psychology and Education (New York: Longmans, Green and Company, 1950), p. 272.

[2]Verner M. Sims, Score Card for Socio-Economic Status (Bloomington, Illinois: Public School Publishing Company, 1927), 4 pp.

[3]Richard D. Allen and others, Metropolitan Achievement Test, Form R, Test 3, Arithmetic Fundamentals, Test 4, Arithmetic Problems (New York: World Book Company, 1946).

eighth grade at Mark Twain School in the fall of 1951 were included in the study. This comprised more than 90 per cent of the eighth-grade enrollment.

Briefly, the results of the computations show a positive coefficient of correlation of .47 with a probable error of .03. The median score on the mathematics test was 7.68. On the Sims Score Card, which has a range of from 0 to 36 (indeterminately low to indeterminately high) the median score was 12.98, which is classed by Sims as medium high.[4] The relative significance of these figures will be taken up in a later chapter.

The remainder of the thesis is organized by chapter divisions so as to present the following: important related studies in the field; the three distinct living areas of the Mark Twain School District; a brief discussion of the two correlates, mathematics and socio-economic scores used in obtaining the coefficient of correlation; a consideration of the reliability of the tests used to determine the correlates; a critical review of the statistical results and their significance; a summary of the study with recommendations for further study.

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[4]Verner M. Sims, Manual of Directions for the Sims Score Card for Socio-Economic Status (Bloomington, Illinois: Public School Publishing Company, 1927), p. 13.

CHAPTER II

REVIEW OF THE LITERATURE

Some persons who have been acquainted with intelligence tests have been under the impression that people who live in less fortunate socio-economic environments are less intelligent and do poorer work in the academic field than those living in higher socio-economic surroundings. In the past fifty years, study after study has revealed this to be apparently true.[1] However, in more recent years, a closer examination of the instruments used in measuring intelligence, the tests, has revealed that they are too often prone to give persons of the higher socio-economic status a better score because the items included are more familiar to those persons.[2]

This study is devoted primarily to a consideration of socio-economic status in relation to achievement in mathematics. However, a review of socio-economic status in relation to intelligence (as revealed in studies in the field) is first made because of the wide use of

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[1]Allison Davis, "Socio-Economic Influence on Learning," Phi Delta Kappan, 32:253-56, January, 1951.

[2]Ibid.

intelligence tests in an attempt to determine the child's ability to succeed in school.

One of the earlier studies of the relationship between intelligence and environment was made by Stroud,[3] who reported finding a low, positive correlation between intelligence test scores and economic status. In 1938, Cuff, using the American Council Psychological Test to measure college freshmen, found that: "There is evidently a tendency for freshmen in the higher socio-economic centiles to have more intelligence than freshmen in the lower centiles have."[4]

Further evidence that children from the lower socio-economic levels tend to be less intelligent is the statement by Davis, in which he says:

> According to present "standard" intelligence tests, lower-class children at ages six to ten have an average I.Q. which is 8 to 12 points beneath the average I.Q. of the higher socio-economic group. For children of age 14, the present tests define the average I.Q. of the lowest socio-economic group as being 20 to 25 I.Q. points beneath that of the higher occupational groups.[5]

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[3]J. B. Stroud, "A Study of the Relation of Intelligence Test Scores of Public School Children to the Economic Status of Their Parents," Journal of Genetic Psychology, 35:105-11, March, 1928.

[4]Noel B. Cuff, "Relationship of Socio-Economic Status to Intelligence and Achievement," Peabody Journal of Education, 11:109, September, 1933.

[5]Davis, op. cit., p. 265.

This statement by Davis serves to emphasize the point already made, that an apparent difference of some magnitude exists between the intelligence of the lower and upper socio-economic groups. However, he goes on to say that there is a fallacy in these figures, that the tests which he refers to as "standard" are "loaded" with items which are more familiar to children in the upper socio-economic levels. He says:

> There is now clear, scientific evidence, however, that these tests use chiefly problems which are far more frequently met in urban middle-class culture. New experimental tests, using culturally fair problems, have been constructed. We wish to measure that ability which underlies, uses, and is used by these economic, social, and home factors. This essentially hereditary ability is what we call "real intelligence," "innate ability," "smartness," or "mother-wit." . . . When one controls the socio-economic cultural factors in a test, . . . one finds sound statistical evidence that the average real intellectual ability (or what Binet called "capacity" as contrasted to "information") is in general at the same level for all socio-economic groups.[6]

In another article, Davis points out that in a study of identical twins carried out by Newman, Freeman, and Holzinger:

> When a twin had been reared in a well-to-do home and his identical twin, born from the same egg and sperm, had been reared in a poor home, the tests

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[6] Ibid.

> always define the latter twin as "less intelligent." But in fact, their real intelligence was exactly the same by heredity.[7]

This point of view is further substantiated by the findings of Neff who says:

> If every single individual in society had precisely equal opportunity, encouragement, and stimulation to acquire education and information, and if the fund of things to be learned was common to all, then it might follow that intelligence test score would be a fairly accurate measure of ability.[8]

In a consideration of socio-economic status in relation to school success, examination of some of the studies in the field reveals, as in the case of intelligence, that there is a positive correlation between success in school and socio-economic status. Blair[9] reports that he found statistically significant differences between mentally superior and mentally inferior children in five categories. These were: the birthplace of their parents, the occupation of their parents, their school

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[7]Allison Davis, "Our Cultural Bias," The Education Digest, 14:1-4, February, 1949.

[8]W. S. Neff, "Socio-Economic Status and Intelligence: A Critical Survey," Psychological Bulletin, 35:727-57, December, 1938.

[9]Glenn Myers Blair, Mentally Superior and Inferior Children in the Junior and Senior High School (Bureau of Publications, Teachers College, Columbia University, Contributions to Education No. 766, New York, 1938).

subject preferences, the types of school activities in which they engaged, and their preferences in reading.

Counts[10] in 1922 used telephones as an index of culture and reported that phones are two and one-half times as frequent in homes of children in high school as in homes of children in trade school, and that the percentage of phones increased for high school children at each grade level of school.

Holly, in 1916 stated that:

> There is a high correlation between the economic, educational, and social advantages of a home and the number of years of schooling which its children receive.[11]

According to Brunner,[12] attainment in education increases in the higher socio-economic levels, and in his study of the relation between intellectual performance and social and economic background, Osborne reports that: "This

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[10]George Sylvester Counts, The Selective Character of American Secondary Education (Chicago: University of Chicago Press, 1922), Chapter IX.

[11]Charles E. Holley, "The Relationship Between Persistence in School and Home Conditions," Fifteenth Yearbook of the National Society for the Study of Education, Part II (Bloomington, Illinois: Public School Publishing Company, 1916), p. 285.

[12]E. S. Brunner, "Educational Attainment and Economic Status," Teachers College Record, 49:242-49, January, 1948.

study shows a tendency for the poorer students within each group to have some inferior background characteristics."[13]

Havighurst and Breese[14] report a correlation of + .32 ± .10 between environment and the ability to do numerical calculations accurately and rapidly.

Why do reports of the relation between home environment and attainment and persistence in school indicate that a positive correlation exists between the two? One of the answers to this question lies in a statement by Cronbach, in his book on psychological testing in which he says:

> Whether norms are satisfactory depends on three questions: (1) Are the norms based on a sufficiently large group? (2) Is the standard group representative? (3) Does the standard group resemble the persons with whom we wish to compare our subject?[15]

An example of how this would apply to the question at hand is in the use of a test standardized on children who begin learning a subject, say arithmetic, in grade

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[13]Richards C. Osborne, "How is Intellectual Performance Related to Social and Economic Background," Journal of Educational Psychology, 34:215-28, April, 1943.

[14]R. J. Havighurst and F. H. Breese, "Relation Between Ability and Social Status in a Midwestern Community: Primary Mental Abilities," Journal of Educational Psychology, 38:241-47, April, 1947.

[15]Lee J. Cronbach, Essentials of Psychological Testing (New York: Harper and Brothers, Publishers, 1949), p. 49.

two on children who begin learning the same subject at grade one-six. The result is that the scores of the children being tested will be one-half year above the norms for their age.

A second answer to the question lies in the factor of "teacher environment." Davis states that:

> Ninety-five out of every hundred teachers are from the middle socio-economic group. . . . In our country as a whole, more than sixty out of every one hundred children live in families of the lower socio-economic groups. . . . It is cause for worry, when the average child from the lower socio-economic group in this country is retarded by two years on achievement tests when he reaches the eighth grade.[16]

Davis goes farther in pointing out the importance of the effects of the teachers' backgrounds on student achievement in school by saying:

> Each social-status level has a way of life, or culture, which differs in many respects from the cultural way of life of other social classes. The behavior in slum children which middle-class teachers, clinicians, and psychiatrists often regard as "delinquent" or "hostile" or "unmotivated" is usually a realistic, adaptive, and--in slum life--socially acceptable response to reality. The store of ability in these millions of children in the lower socio-economic groups is largely wasted because their teachers do not understand the basic cultural habits of the working groups.[17]

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[16]Davis, "Socio-Economic Influence on Learning," p. 253.

[17]Ibid.

A third answer to the question is that the children from the lower socio-economic group have less incentive to apply themselves in school than do those of the higher groups. In regard to this Davis says:

> The family's insistent pressure upon them for early and rapid attainment, and for conscientious work habits, makes middle-class children work much harder in school.[18]

In summary, there are two theories which have been considered important in the past, and which have influenced man's thinking in relation to the problem of socio-economic status and its effect upon intelligence and achievement in school. First, the theory that children of lower socio-economic status are less intelligent than those of the higher levels was brought about by extensive testing programs which apparently proved this to be true. However, careful examination of the tests used has shown cultural bias in the items included in the tests.

The second theory, that children of the lower socio-economic levels do inferior work in school, has not been discarded because it is true. However, it is important to consider the reason for such a condition. That reason, according to the authorities quoted, lies in three

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[18] Ibid., p. 884.

important factors, as follows:

1. Test norms are not always valid.
2. Teachers do not understand the cultural patterns of the lower socio-economic classes.
3. Children from the lower socio-economic groups have little incentive to apply themselves in school.

The evidence indicates, therefore, that teachers can expect lower than average scores on achievement tests for children of the lower socio-economic levels (as a group) unless the foregoing conditions are removed.

CHAPTER III

THE SCHOOL AND CITY

The city of Modesto and its surrounding environs is divided in half for the purpose of districting the two Junior High Schools--Mark Twain and Roosevelt. The Mark Twain boundary follows the main thoroughfare, highway 99, from the State Hospital south to Hatch Road. Along the length of this highway, which roughly divides the city in half, the Roosevelt School District begins. On the south the Mark Twain District joins the Ceres School District along Hatch and Crows Landing Roads. Part of the eastern boundary is formed by the Tuolumne River, and the remainder by the Paradise and Hart-Ransome School Districts of Stanislaus County. These boundaries and the Mark Twain School District, as divided into sections for study in this project, are represented in Figure 1.

Within these boundaries there are three distinct areas in terms of living conditions, local government, and population. The first is the central area, within the limits of the west side of the City of Modesto, where housing is old and people have had permanent residences for many years. Approximately 20 per cent of the children attending Mark Twain School live in this section.

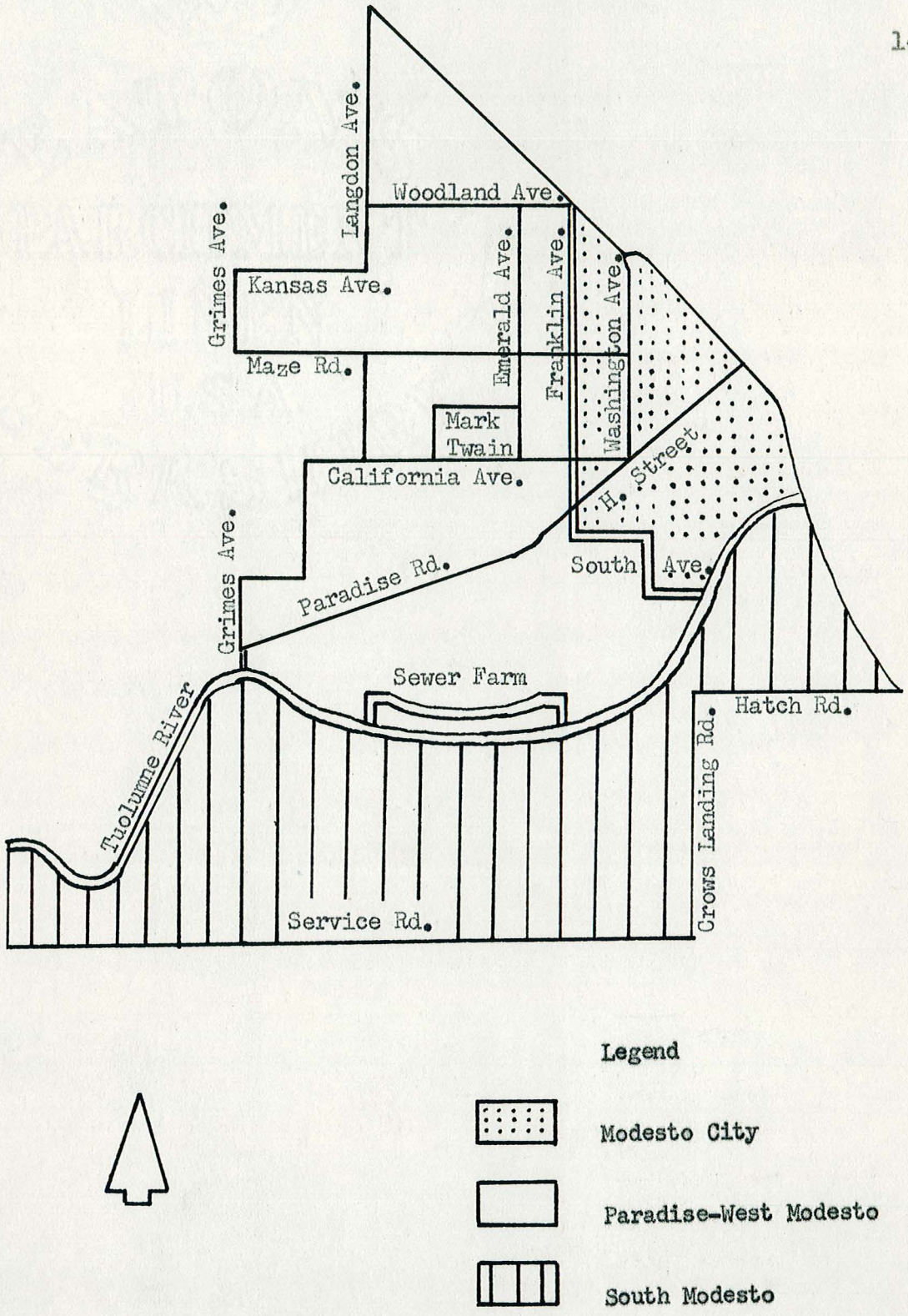

FIGURE 1

MARK TWAIN SCHOOL DISTRICT

The second area lies south of the Tuolumne River and is commonly referred to as "South Modesto Acres," though it is neither incorporated nor included in the city of Modesto. Both permanent residents and a large number of transient fruit workers reside there. The population is, therefore, partly mobile, though many of the residents are settled permanently but have not enjoyed such status for long. Approximately 40 per cent of the students attending Mark Twain School reside in South Modesto Acres.

The third area is known as the Paradise Section of Greater Modesto and lies to the south of the city and west of the Tuolumne River. It is as newly developed an area as South Modesto, for the most part, although a nucleus of older residences lies within a quarter of a mile of the city limits. From this and the so-called West Modesto Area, which joins it on the north, but which for practical purposes may be included as a part of the Paradise Section because census figures indicate the two to be very much alike, come the remaining 40 per cent of the Mark Twain students.

A more revealing comparison of the three areas may be gained by consulting Tables I, II, III, IV, and V. These tables were all made from figures released by the

United States Department of Commerce for the 1950 Census.

In Table I, the most obvious fact is that Greater Modesto is much larger than the actual city of Modesto, with a population figure of 52,157 as compared with 17,389. In 1950 there were 4,426 people in the Paradise District, 4,678 in South Modesto, and 2,038 in West Modesto. The remaining 23,632 resided outside the Mark Twain School District, as did something more than one-half the residents of the city proper.

Figures in Table II, page 18, Table III, page 19, Table IV, page 20, and Table V, page 21, are more indicative of socio-economic conditions in each of the three areas, with South Modesto showing the lowest over-all average. An interesting factor revealed in Table V, page 21, is that more of the residents in South Modesto had television sets while less had hot and cold water than those of the other areas (on a percentage basis).

Table IV, page 20, shows that the average sized home in South Modesto in 1950 contained from three to four rooms while in the other areas the figures are four to five rooms. Persons per dwelling ran lower by a fraction in South Modesto, but persons per room higher than in the other two districts.

Median education and income for the three areas,

TABLE I

POPULATION FIGURES FOR THE CITY OF MODESTO, GREATER MODESTO, AND UNINCORPORATED AREAS LYING TO THE WEST AND SOUTH OF THE CITY*

Population Area	Population in 1950
Greater Modesto	52,157
City of Modesto (incorporated area)	17,389
Paradise-West Modesto District	6,464
South Modesto District	4,672

NOTE: The City of Modesto and the Paradise, West Modesto, and South Modesto Districts are all part of Greater Modesto. Other districts of Greater Modesto, lying to the north and east of the city were not included because they are outside the Mark Twain School District boundaries.

*United States Department of Commerce, Bureau of the Census, Census of Population, 1950, Volume I Number of Inhabitants (Washington, D.C.: United States Government Printing Office, 1952), pp. 5-17.

TABLE II

COMPARATIVE INCOMES FOR INDIVIDUAL WAGE EARNERS IN THE MODESTO, PARADISE, AND SOUTH MODESTO DISTRICTS FOR THE YEAR 1950*

Population Area	Average Individual Income, 1950		
	Under $4,000 Per Cent	Over $4,000 Per Cent	Median
Modesto	60	40	$2,873
Paradise	55	45	3,109
South Modesto	80	20	1,881

*United States Department of Commerce, Bureau of the Census, Census of Population, 1950, Bulletin PB-5 California General Characteristics (Washington, D.C.: United States Government Printing Office, 1952), pp. 117-48.

TABLE III

MEDIAN EDUCATION, AS INDICATED IN YEARS OF SCHOOL COMPLETED FOR THE MODESTO, PARADISE, AND SOUTH MODESTO DISTRICTS FOR PERSONS OVER AGE TWENTY-FIVE*

Population Area	Average Grade-Level Completed
Modesto	10.9
Paradise	10.0
South Modesto	8.1

*United States Department of Commerce, Bureau of the Census, Census of Population, 1950, Bulletin PB-5, California, General Characteristics (Washington, D.C.: United States Government Printing Office, 1952), pp. 100-137.

TABLE IV

TOTAL DWELLING UNITS, PERSONS PER DWELLING, ROOMS PER DWELLING, AND PERSONS PER ROOM FOR THE MODESTO, PARADISE, AND SOUTH MODESTO DISTRICTS*

Population Area	Dwelling Units	Persons per Dwelling	Rooms per Dwelling	Persons per Room
Modesto	6,484	3.1	4-5	Under 1
Paradise	1,402	3.2	4-5	Under 1
South Modesto	1,456	3.0	3-4	1-2

*United States Department of Commerce, Bureau of the Census, Census of Housing, 1950, Bulletin HA-5 California, General Characteristics (Washington, D.C.: United States Government Printing Office, 1952), pp. 19-25.

TABLE V

PERCENTAGE OF HOMES HAVING HOT AND COLD RUNNING WATER, RADIOS, AND TELEVISION SETS IN THE MODESTO, PARADISE, AND SOUTH MODESTO DISTRICTS*

Population Area	Hot and Cold Running Water Per Cent	Radio Per Cent	Television Set Per Cent
Modesto	95	97.1	1.7
Paradise	95	99	1
South Modesto	60	91	2

*United States Department of Commerce, Bureau of the Census, Census of Housing, 1950, Bulletin HA-5, California, General Characteristics (Washington, D.C.: United States Government Printing Office, 1952), pp. 17-71.

as seen in Table II, page 16, and Table III, page 19, respectively, are higher in the city and in the Paradise area than in South Modesto, varying as much as 2.8 years in the former and $1,228.00 in the latter.

The importance of the figures in the five tables is that socio-economic conditions in South Modesto, where the transient group is large, are not as favorable as in the remaining areas of the school district. This becomes more significant when it is remembered that the pupils are divided into classes at Mark Twain School according to intelligence quotients and standardized reading test scores with liberal revision made on the basis of teacher recommendations. In spite of this method of grouping, which does not take into account a child's home situation, each of the below-average groups in the school during the year 1951-1952, contained more children from South Modesto than from the other areas.

The coefficient of correlation between socio-economic status and achievement in mathematics for the eighth-grade students at Mark Twain School during that year appears to be a valid measure when considered in light of these figures.

CHAPTER IV

THE MATHEMATICS CORRELATE: THE METROPOLITAN ACHIEVEMENT TEST

Each child entering the eighth grade at Mark Twain School theoretically will have completed sufficient work in mathematics in the first seven years of school to achieve a score of 8.0 on a standardized achievement test, on the average. However, individual differences in ability and teaching methods used in the lower grades can cause a wide range of scores. The three hundred eighth-grade students in this study had scores ranging from 4.1 to 11.5, or from 3.9 grade levels below expected achievement to 3.5 grade levels above, on the Metropolitan Achievement Test--a copy of which appears in Appendix B.

The mean and median of the scores are 7.95 and 7.68, respectively. The test was administered during the first month of the eighth year of school, and it is clear that as a group the children fall below the level of achievement expected of them on the standardized tests. (This amounts to .05 and .32 grade levels on the mean and median, respectively, with each tenth of a grade level representing one month of the school year.) However, this does not affect the outcome of the correlative methods used,

because all of the children were given the same test and each child's score was compared statistically with his own score on the socio-economic score card.

The program of arithmetic in the elementary schools of California is based upon the following major objectives, as listed by Brueckner and Grossnickle in their state adopted series, Arithmetic We Use:

> The major objectives of the modern arithmetic program are (1) to develop in the learner the ability to perform the various number operations skillfully and with understanding, and (2) to provide a rich variety of experiences which will assure the ability of the pupil to apply quantitative procedures effectively in social situations in life outside the school.[1]

It is not necessary in connection with the present study to discuss each process taught about whole numbers, fractions, decimals, and per cent in the program preceding the eighth grade. However, the major emphases, or outcomes toward which the program is pointed, listed by Brueckner and Grossnickle as outcomes related to the mathematical and social phases of arithmetic are as follows:

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[1] Leo J. Brueckner and Foster E. Grossnickle, How to Make Arithmetic Meaningful (New York: The John C. Winston Company, 1945), p. 1.

I. Outcomes related to the mathematical phase of arithmetic.

A. An understanding of the structure of the decimal number system and an appreciation of its simplicity and efficiency as compared with other number systems.

B. The ability to perform computations connected with social situations with reasonable speed and accuracy, both mentally and with mechanical computing devices.

C. The ability to make dependable estimates and approximations.

D. Resourcefulness and ingenuity in perceiving and dealing with quantitative aspects of situations.

E. Understanding of the technical vocabulary used to express quantitative ideas and relations.

F. Ability to use and to devise formulas, rules of procedure, and methods of bringing our relations.

G. Ability to represent designs and special relations by drawings.

H. The ability to arrange numerical data systematically and to interpret information presented in graphic or tabular form.

II. Outcomes related to the social phase of arithmetic.

A. Understanding of the process of measurement and skill in the use of precision.

B. Knowledge about the development and social significance of such institutions as money, taxation, banking, standard time, and measurement.

C. Knowledge of the kinds and sources of information essential for intelligent buying and selling and for general economic competence.

D. Understanding of the quantitative vocabulary encountered in reading, in business affairs, and in social relations.

E. Appreciation of the contributions number has made to the development of social cooperation and to science.

F. Ability and disposition to secure and utilize reliable information in dealing with emerging personal and community problems.

G. Ability to rationalize and analyze experience by utilization of quantitative procedures.[2]

Each year, or at each grade level, a certain number of new phases of the mathematics process are taught. In the seventh year they include division by a three-figure divisor, division by a decimal, finding a per cent of a number, finding what per cent one number is of another, finding areas of certain figures, and a beginning of informal geometry of shape.[3]

When the child enters the eighth grade, he learns for the first time how to find a number when a per cent of it is given, how to find the volumes of certain solids, the informal geometry of size, shape, and position,

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[2]Ibid., pp. 2-3.

[3]Leo J. Brueckner and Foster E. Grossnickle, Mathematics We Use, Book I (Sacramento: California State Department of Education, 1948), p. 1.

indirect measurement by scale drawing, ratios and square root, equations and signed numbers, and social applications of mathematics in such topics as investing money, insurance, and taxation.[4]

The Metropolitan Achievement Test in Arithmetic,[5] is evaluated in Buros by Robert L. Busch, associate editor of elementary school textbooks for Ginn and Company, as follows:

> The analysis of items, equating of forms, establishment of norms, and determination of reliability and validity have been neatly designed and scientifically executed. . . . The reliability coefficients, which vary from .87 to .95, indicate a degree of dependability that is adequate for group testing. . . . If the test user is willing to overlook the conservatism of the authors in limiting the content of the arithmetic tests basically to computation and to the solution of verbal problems, he will find that these are excellent tests which have been developed in accordance with the best available information in test construction.[6]

The Metropolitan Achievement Test provides two scores in arithmetic, one for fundamentals, and the other

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[4]Leo J. Brueckner and Foster E. Grossnickle, Mathematics We Use, Book II (Sacramento: California State Department of Education, 1948), p. 1.

[5]Richard D. Allen and others, Metropolitan Achievement Test, Form R, Test 3, Arithmetic Fundamentals, Test 4 Arithmetic Problems (New York: World Book Company, 1946).

[6]Oscar K. Buros (ed.), Fourth Mental Measurements Yearbook (Highland Park, New Jersey: The Gryphon Press, 1953), p. 416.

for problems. A grade level of achievement is computed for each and for the average of both. The latter figure was used in this study.

CHAPTER V

THE ENVIRONMENT CORRELATE: THE SIMS SCORE CARD

Socio-economic status refers to the general cultural, social, and economic background factors in one's environment.[1] Relative income has a marked effect on this status because an individual's cultural and social opportunities are largely determined by his financial ability to participate in the activities of which they are composed. Determination of an individual's socio-economic status is usually made by administering him a score card designed for that purpose.

In this study, the Sims Score Card for Socio-Economic Status was used.[2] No evaluation of the score card is included in Buros. Because of this, a brief consideration of how it was developed and the tests of reliability and validity which were applied to it are included in this chapter.

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[1]Verner M. Sims, The Measurement of Socio-Economic Status (Bloomington, Illinois: Public School Publishing Company, 1928), p. 1.

[2]Verner M. Sims, Score Card for Socio-Economic Status (Bloomington, Illinois: Public School Publishing Company, 1927), 4 pp.; see Appendix B, p. 57.

In his dissertation, which was presented the faculty at Yale University in partial fulfillment of the requirements for the degree of Doctor of Philosophy, Sims states:

> The study here presented is a description of the procedure involved in constructing . . . an instrument for measuring certain aspects of the home background. It has . . . the quantitative combination of various indices to give a measure of the total complex. . . .[3]

Sims further states that he and his assistants,

> . . . have attempted to determine the validity and intercorrelation of the several items included, and to weigh each accordingly. Furthermore, we have determined the reliability of the total measure and have submitted it to an external criterion as a test of its validity.[4]

Bi-serial correlations were used in determining the relative value of each question by comparing it with the average. An external measure for correlative purposes would have been better, but since none existed, the average measure achieved on the score card was deemed to be the best substitute available. The correlation between random halves of the score card, in its final form, was found to be .91, corrected from .83 with the Brown formula.[5]

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[3]Sims, The Measurement of Socio-Economic Status, p. 5.

[4]Ibid.

[5]Ibid., p. 10.

The validity of the Score Card was determined, according to Sims, by selecting groups of subjects on obviously different levels and seeing whether it differentiated between them. The groups, in this case, were the students in three different schools, located in sections of the city of New Haven, Connecticut, and recognized as varying in degree of level of socio-economic status. Sims describes this as follows:

> A priori reasoning would anticipate the following differences between the three distributions: For the low school, a very low average with a narrow range; for the second school, a wide range but a high average; for the third school, a narrow range and a high average. That is exactly what was found.[6]

In discussing proper administration of his Score Card, Sims states:

> These directions have been developed by trial to insure that every child shall understand exactly what he is to do. All the questions likely to be encountered have been anticipated in the directions, but any sensible question asked by a child should be answered. Give the instructions slowly, clearly, and with serious interest, with the expectation that the pupils will respond to your own mood.[7]

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[6] Ibid.

[7] Verner M. Sims, Manual of Directions for the Sims Score Card for Socio-Economic Status (Bloomington, Illinois: Public School Publishing Company, 1927), p. 3.

When the score card was administered to the three hundred children at Mark Twain School, each child was given his mathematics score from the Metropolitan Achievement Test. This number was written on the face of his copy of the score card. No other means of identification was used. The purpose of this was to put the children at ease so they would be willing to give frank and truthful answers.

Each question was read aloud to the children, as called for in the instructions for administering the score card. At the end of the administration period time was allowed so that each child could go back over his paper and make certain that he had answered every question. Individual questioning of the children who failed to answer any item was made at this time to clarify in their minds what was called for. This is necessary because in cases where more than three questions are unanswered on a score card, the scoring will be interfered with.

The combined scores achieved by the Mark Twain School students are listed in Table VI. This table also serves as a conversion table for raw scores achieved on the score card. The Mark Twain students' scores range from 29 (highest) to 2 (lowest), and the mean and median for the group were 13.95 and 12.98, respectively. On the conversion table these amount to medium high scores.

TABLE VI

PROVISIONAL LEVELS OF SOCIO-ECONOMIC STATUS INCLUDING THE SCORES ACHIEVED AT EACH LEVEL BY THE MARK TWAIN SCHOOL STUDENTS

Score	Corresponding Percentile	Suggested Rating	Level of Socio-Economic Status	Mark Twain Results
36		10	Indeterminately High	0
29.8	94.5	9	Highest	1
24.5	88.5	8	Very High	14
17.6	78.5	7	High	84
13.2	65.5	6	Medium High	73
10	50	5	Medium	63
7.5	34.5	4	Medium Low	44
5.1	21.2	3	Low	9
3.3	12.5	2	Very Low	11
1.8	5.5	1	Lowest	1
0.0		0	Indeterminately Low	0

Theoretically these scores should fall in the medium range. However, the score card was developed in 1927, and since that time higher standards of living have caused more people to obtain items used by Sims as a basis for determining socio-economic status.

However, as indicated in Chapter IV, this does not affect the statistical results of the study because each child's socio-economic rating was compared with his own rating in arithmetic. The correlation between the two sets of scores remains the same so long as each score's relative position within the group remains unchanged.

CHAPTER VI

STATISTICAL RESULTS AND THEIR SIGNIFICANCE

The obtained r (coefficient of correlation) between the scores on the Metropolitan Achievement Test and the scores on the Sims Score Card for the three hundred children included in this study was .47. This figure was derived by using the product-moment method of calculation developed by Pearson.[1]

The first step taken to determine the obtained r was construction of the scattergram in Table VII. This provided a chart on which it may be seen that the scores tend to spread themselves in a pattern from the upper right hand corner where both high mathematics scores and high socio-economic status scores are represented, to the lower left hand corner where the values are low for both variables. The significance of this observation lies in the fact that such a pattern indicates a positive correlation, though not necessarily high. Perfect positive correlation, expressed by the value + 1.00, would be represented on the scattergram by a straight line of

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[1]Henry E. Garrett, Statistics in Psychology and Education (New York: Longmans, Green and Company, 1950), pp. 272-88.

TABLE VII

SCATTERGRAM CONSTRUCTED FROM MATHEMATICS AND SOCIO-ECONOMIC SCORES ACHIEVED BY THE MARK TWAIN STUDENTS

Mathematics Scores	Socio-Economic Scores														
	1-2	3-4	5-6	7-8	9-10	11-12	13-14	15-16	17-18	19-20	21-22	23-24	25-26	27-28	29-30
11.1-11.5							6	5	3	1	5	4	1		1
10.6-11.0						1	1		1	2					
10.1-10.5						8	1	2	2	2		1			
9.6-10.0					1	2	1	1	1		2	1			
9.1- 9.5					1	1	1	1	1	2		1			
8.6- 9.0					3	3	2	2	3	1	1		1	1	
8.1- 8.5					7	4	5	4	6	8	2	3	1	1	
7.6- 8.0		2	2	3	9	7	6	3	5	4	2	1	1		
7.1- 7.5		3	1	8	4	9	10	5	6	9		3	1		
6.6- 7.0		1	2	4	4	4	8	1	2	1	1				
6.1- 6.5		1	1	1	3	3	2	3	1						
5.6- 6.0		4	1	2	5	2	1	2							
5.1- 5.5	1		1	3	2	2									
4.6- 5.0			1	2	1										
4.1- 4.5				1	1	2									

figures from the upper right corner to the lower left corner.

Calculation of the coefficient of correlation from the information provided by the scattergram involves the use of formulas designed for this purpose. These formulas, the computations made with them, and the frequency tables necessary to the operation may be found in Appendix A, pages 53-56.

The reliability and validity of a coefficient of correlation are determined by applying to it the usual tests devised for this purpose. An obtained r may be considered as worthy of confidence if it is at least four times as large as its probable error.[2] In this study the probable error is .04 as found by use of the formula for this value.[3] The obtained r can be considered as a reliable measure because it is more than four times this amount.

A second method of testing the reliability of a coefficient of correlation is by using the Null Hypothesis.[4] This involves a comparison between the t value of the r

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[2]Ibid., p. 296.

[3]Ibid., p. 297.

[4]Ibid., p. 298.

with t's to be expected by chance at the .05 and .01 limits. The quantity t is simply distance from the mean expressed in terms of the standard error of the mean. Application of the formula devised for this produces a t score of 9.19 for the obtained r of .47.

T's to be expected by chance at the .05 and .01 levels for the number of cases in this study (three hundred) are 1.97 and 2.59, respectively. These values are much lower than 9.19, which means that there would be less than one chance in one hundred (.01) that the coefficient of correlation of .47 would be obtained by accident if the true correlation were .00.[5] Similar application can be made at the .05 level, showing that there would be less than five chances in one hundred that the obtained r would be obtained by accident if the true correlation were .00. Therefore, the null hypothesis is disproved and the obtained r is considered significant.

One other method of testing the reliability of the coefficient of correlation was used. This was by comparing it with the tabulated entries in a table of correlation coefficients at the 5 per cent and 1 per cent levels of

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[5] Ibid., p. 190.

significance.[6] For 298 degrees of freedom (N-2), the entries in the table are .113 and .149, respectively. This means that if the true r were .00, only five times in one hundred trials would an r as large as ± .113 appear by accidents of sampling, and only one time in one hundred would it be ± .149. Therefore, the r in all probability is not .00 and since the obtained r is .47, much greater than .149, it must be considered as very significant.[7]

The three tests of reliability applied thus far do not indicate whether or not the obtained r is a relatively high or low value. This must be done by comparing it with standards set up by authorities in the field and by comparing it with other obtained r's in similar studies. About the first, Garrett says:

> While the descriptive label applied will vary somewhat in meaning with the author using it, there is fairly good agreement among workers with psychological and educational tests that an
>
> r from ± .00 to ± .20 denotes indifferent or negligible relationship;
>
> r from ± .20 to ± .40 denotes low correlation, present but slight;

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[6] Ibid., p. 299.

[7] Ibid., p. 300.

r from ± .40 to ± .70 denotes substantial or marked relationship;

r from ± .70 to ± 1.00 denotes high to very high relationship.[8]

It is evident that the relationship between the two sets of scores in this study is substantial, if the standards set forth above are applied. There remains but to determine its relative value by comparing it with the results of other studies in the field. The importance of this comparison lies in the fact that a coefficient which is numerically small might be relatively large. Walker says:

> Several different bases exist for interpreting the size of a coefficient of correlation, and some confusion has arisen because . . . a coefficient which might be called "large" in one connection would be considered "small" in another.[9]

In reporting the results of studies other than his own, Gough says:

> Kerr and Remmers report a correlation of .41 between the grade-point average for four high school years and socio-economic status, as measured by their scale.[10]

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[8]Ibid., p. 333.

[9]Helen M. Walker, Elementary Statistical Methods (New York: Henry Holt and Company, 1943), p. 246.

[10]H. J. Gough, "Relationship of Socio-Economic Status to Personality Inventory and Achievement Test Scores," Journal of Educational Psychology, 37:532-33, December, 1946.

Shaw[11] reports a positive correlation of .38 between marks on the Sims Score Card and average school grades, while Chauncey[12] found scores of .30 and .35 for eighth and ninth graders, respectively, as correlations between the Stanford Achievement Tests and the Sims Score Card.

These reports indicate that the coefficient of correlation of .47 obtained in this study is fairly representative of the average and can be considered relatively high.

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[11] D. C. Shaw, "The Relation of Socio Economic Status to Educational Achievement in Grades IV-VIII," Journal of Educational Research, 37:197-201, November, 1943.

[12] M. R. Chauncey, "The Relation of the Home Factor to Achievement and Intelligence Test Scores," Journal of Educational Research, 20:86-90, September, 1929.

CHAPTER VII

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The Mark Twain School in Modesto, California, is a seventh- and eighth-grade school, organized as part of the Modesto Elementary School District. In most ways it resembles a typical junior high school, and is departmentalized. Children are placed in classes according to intelligence quotients and reading scores achieved on standardized tests. Observation of the results of this system of grouping reveals that more children from the community's area of poorest socio-economic conditions are placed in the low ability groups than in the high. This observation led to the thesis that the children from homes of low socio-economic status would, in general, tend to perform less well in mathematics than those from homes of high socio-economic status. Mathematics was chosen for correlation with socio-economic status because the investigator of the study was, at the time, a teacher of mathematics in the school.

A review of the literature revealed an apparent correlation of some magnitude between home environment and both intelligence and achievement in schools throughout the nation. However, it also revealed that intelligence

tests tend to have included some questions which deal with situations unfamiliar to members of the lower class culture. The review also revealed that teachers, as a group, come from the middle class and find it hard to understand the behavior of children from the lower class. There was also an indication that achievement tests often are not "standard," because they have been standardized on limited groups. These factors, as well as a lack of incentive on the part of the children from the lower class, have a marked effect, in the opinion of the authorities in the field, on the scores achieved by these children on standardized tests.

Three hundred students enrolled in the Mark Twain School were given, in the fall of 1951, the Metropolitan Achievement Test in Arithmetic and the Sims Score Card for Socio-Economic Status. The median scores achieved were 7.68 and 18.98 (medium high), respectively. A statistically reliable and significant coefficient of correlation of + .47 with a probable error of .03 was found to exist between the two sets of scores. The Pearson Product-Moment method of calculating a coefficient of correlation was used, and the obtained r was found to be relatively high when compared with others in the field.

The Metropolitan Achievement Test has a reliability coefficient of .90 and the Sims Score Card one of .91.

The obtained r of + .47 reveals a situation parallel to that shown in the literature. This coefficient of correlation cannot be considered as an absolute figure, however, because it is affected by many variables. The most important of these is the condition prevailing at the time a group test or score card is given the children in the study. In the case of the Sims Score Card, it is possible that some of the children exaggerated or over-rated their home conditions.

A further limitation is that the Score Card was developed in 1927 and since that time a general rise in standards of living has taken place. However, the relative position of each child's score probably would not change to a great extent if the score cardswere to be revised.

Three recommendations for further study can be made on the basis of the information brought forth in this project. First, tests of intelligence should be standardized among children at all levels of socio-economic status. Second, tests of achievement should also be standardized among groups representing all culture patterns. Third, teacher-training institutions should investigate the possibility of providing in their programs a required study of the culture patterns of children of all socio-economic levels.

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APPENDIX A

FREQUENCY DISTRIBUTION OF MATHEMATICS SCORES ACHIEVED BY MARK TWAIN STUDENTS WITH INFORMATION FOR COMPUTING COEFFICIENT OF CORRELATION

Interval	fy	y'	fy'	$f(y'^2)$	Σx'y' +	Σx'y' -
11.1 - 11.5	26	7	182	1214	336	42
10.6 - 11.0	5	6	30	180	30	18
10.1 - 10.5	10	5	50	250	50	25
9.6 - 10.0	9	4	36	144	44	32
9.1 - 9.5	7	3	21	63	20	18
8.6 - 9.0	17	2	34	68	38	34
8.1 - 8.5	43	1	43	43	53	34
7.6 - 8.0	45	0	0	0	0	0
7.1 - 7.5	61	-1	-61	61	95	43
6.6 - 7.0	28	-2	-56	112	120	14
6.1 - 6.5	15	-3	-45	135	96	3
5.6 - 6.0	17	-4	-68	272	228	0
5.1 - 5.5	9	-5	-45	225	170	0
4.6 - 5.0	4	-6	-24	144	96	0
4.1 - 4.5	4	-7	-28	196	77	0
Total	300		69	3107	1190	

Legend:

fy Frequency of scores at each interval.
y' Deviation of interval from assumed mean.
fy' Frequency multiplied by deviation.
$f(y'^2)$ Frequency multiplied by deviation squared.
Σx'y' Summation of the "product-deviations" from the assumed mean of both mathematics and socio-economic scores at each frequency interval.

FREQUENCY DISTRIBUTION OF SOCIO-ECONOMIC SCORES ACHIEVED BY MARK TWAIN STUDENTS ON THE SIMS SCORE CARD WITH INFORMATION FOR COMPUTING COEFFICIENT OF CORRELATION

Interval	fx	x'	fx'	f(x'^{2})	Ex'y' +	Ex'y' -
29 - 30	1	7	7	49	49	0
27 - 28	2	6	12	72	18	0
25 - 26	5	5	25	125	50	5
23 - 24	14	4	56	224	168	12
21 - 22	13	3	39	117	141	6
19 - 20	30	2	60	120	90	22
17 - 18	34	1	34	34	55	15
15 - 16	29	0	0	0	0	0
13 - 14	44	-1	-44	44	36	69
11 - 12	42	-2	-84	168	116	74
9 - 10	41	-3	-123	369	192	60
7 - 8	24	-4	-96	384	244	0
5 - 6	9	-5	-45	225	115	0
3 - 4	11	-6	-66	396	144	0
1 - 2	1	-7	-7	49	35	0
Total	300		-352	2376	1190	

Legend;

fx	Frequency of scores at each interval.
x'	Deviation of interval from assumed mean.
fx'	Frequency multiplied by deviation.
f(x'^{2})	Frequency multiplied by deviation squared.
Ex'y'	Summation of the "product-deviations" from the assumed mean of both mathematics and socio-economic scores at each frequency interval.

COMPUTATION OF THE COEFFICIENT OF CORRELATION AND PROBABLE ERROR

$$c_x = \frac{fx'}{N} \qquad c_y = \frac{fy'}{N}$$

$$c_x = \frac{-232}{300} = -.773 \qquad c_y = \frac{69}{300} = .23$$

$$c_x^2 = .5975 \qquad c_y^2 = .0529$$

$$\sigma x = \sqrt{\frac{fx'^2}{N} - c_x^2} \times i \qquad \sigma y = \sqrt{\frac{fy'^2}{N} - c_y^2} \times i$$

$$\sigma x = \sqrt{\frac{2376}{300} - .598} \times 2 \qquad \sigma y = \sqrt{\frac{3107}{300} - .053} \times .5$$

$$\sigma x = \sqrt{7.92 - .598} \times 2 \qquad \sigma x = \sqrt{10.356 - .053} \times .5$$

$$\sigma x = \sqrt{7.322} \times 2 \qquad \sigma x = \sqrt{10.303} \times .5$$

$$\sigma x = 2.708 \times 2 \qquad \sigma x = 3.209 \times .5$$

$$\sigma x = 5.404 \qquad \sigma x = 1.605$$

$$r = \frac{\Sigma x'y' - c_x c_y}{\sigma x \sigma y} = \frac{\frac{1190}{300} - (-.773 \times .23)}{5.404 \times 1.605}$$

$$r = \frac{3.967 - (-.1778)}{8.673} = \frac{4.085}{8.673} = .47$$

$$P.E._r = \frac{.6745(1-r^2)}{\sqrt{N-1}} = \frac{.6745(1-.2209)}{\sqrt{299}}$$

$$P.E._r = \frac{.5255}{17.292} = .03$$

APPENDIX B

Sims Score Card
Form C

Published by the
Public School Publishing Co.
Bloomington, Illinois

Printed in U. S. A.

SIMS SCORE CARD FOR SOCIO-ECONOMIC STATUS
Form C

Score.....

1. Name.....
2. Age.....Years and.....Months
3. Grade..... Date.....
4. Have you spent two years in any grade?.....If so, what grades?.....
5. Have you skipped any grades?.....If so, what grades?.....
6. Home address: City..... State.....
7. How many years have you lived in this town?.....
8. Have you attended schools in any other towns?.....If so, name them.....
9. Name of your School.....

Don't answer any of the questions below until you are told what to do.

If you have brothers or sisters in this school, write their names and grades on these lines:

Name..... Grade.....

Name..... Grade.....

In the Following Questions Underline the Correct Answer:

Are you a Boy? a Girl? (Underline correct answer)

Are you living at home with your parents?.....Yes No

Are you living in the home of someone else, such as a relative, adopted parent, guardian, etc.?.....Yes No

Are you living in an institution, such as an orphan asylum or a home for children?.....Yes No

Underline the Right Answer

1. Have you a telephone in your home?.....Yes No
2. Is your home heated by a furnace in the basement?.....Yes No
3. Do you have a bathroom that is used by your family alone?.....Yes No
4. Do you have a bank account in your own name?.....Yes No
5. Did your father go to college?.....Yes No
6. Did your mother go to college?.....Yes No
7. Did your father go to high school?.....Yes No
8. Did your mother go to high school?.....Yes No
9. Does your mother (or the lady of the home in which you live) regularly attend any lecture courses of which you know?.....Yes No
10. Do you have your own room in which to study?.....Yes No
11. Do you take private lessons in music?.....Yes No
12. Do you take private lessons in dancing?.....Yes No
13. Does your mother belong to any clubs or organizations of which you know?.....Yes No

    If you know of any, write the name of one of them on this line (.....)
14. Do you belong to any organizations or clubs where you have to pay dues?.....Yes No

    If you do, write the names of the organizations that you belong to on these lines (.....
    .....
    .....)
15. Does your family attend concerts?

    Never **Occasionally** **Frequently**
16. Where do you regularly spend your summers?

    At Home **Away from Home**
17. How often do you have dental work done? (Underline only one)

    Never **When Needed** **Once a Year** **Oftener**
18. How many servants, such as a cook, a housekeeper, a chauffeur, or a maid, do you have in your home?

    None **One Part Time** **One or More All the Time**
19. Does your family own an auto which is not a truck?

    None **One** **Two or More**

    If your family does own an auto, write the make of the auto on this line (.....)
20. How many magazines are regularly taken in your home?

    None **One** **Two** **Three or More**

    If any are taken, write the names of three of them—or as many as are taken—on these lines (.....
    .....)
21. About how many books are in your home? (Be very careful with this one. A row of books three feet long would not have more than twenty-five books in it.)

    None **1 to 25** **26 to 125** **126 to 500** **More**
22. How many rooms does your family occupy?

    2 3 4 5 6 7 8 9 10 11 12 More

    How many persons occupy these rooms?

    2 3 4 5 6 7 8 9 10 11 12 More
23. Write your father's occupation on this line (.....)

    Does he own **Part** **All** **None** of his business? (Underline)

    Does he have any title, such as president, manager, foreman, boss, etc.?.....Yes No

    If he does have such a title, write it on this line (.....)

    How many persons work for him? (Underline the right number)

    None **1 to 5** **5 to 10** **More than 10**

Total Credits..... ÷ No. Answered..... = Score.....

MANUAL OF DIRECTIONS

FOR THE

SIMS

SCORE CARD FOR SOCIO-ECONOMIC STATUS

BY

VERNER M. SIMS
University of Alabama

547-12p

MANUAL OF DIRECTIONS

Purpose of the Score Card

The Score Card under consideration in this Manual was developed by Verner M. Sims, of the Louisiana Polytechnic Institute, Ruston, Louisiana, for the purpose of providing a simple, convenient, and objective device for ascertaining and recording the general cultural, social, and economic background furnished by the homes of school children. The need for such a device is clearly evident to anyone who has had occasion to apply almost any educational or psychological test to pupils or who has been desirous of appraising the environments of children in various other connections. The obvious merit of the score card as a device is that it permits quantitative records and statistical comparisons. Hence, home conditions need no longer be recorded as "average" or "poor" or "good," but may be given a numerical rating that is certainly far more precise than the usual verbal characterizations.

Development of the Score Card

The present Score Card is the product of somewhat extended experimentation carried on at the School of Education, Yale University.[1] It represents a simplified revision of the third form of score card tried by Mr. Sims. Users of the present card will find it instructive to read the author's account of the inception of the device, how and why it was developed into its present form, the statistical justification of its component questions and of the method of scoring them. This account appears in *The Measurement of Socio-Economic Status*, by V. M. Sims, Public School Publishing Co., 1927, which will be sent postpaid to users of this score card for 50c.

Range of Applicability

The Score Card is intended for use with pupils of Grades IV to XII, inclusive. It can be applied, of course, either to individual pupils or to groups of pupils. About 20 to 25 minutes should be available for administering.

Material Needed

The examiner will need one copy of this Manual of Directions, one copy of the Score Card for each pupil to be examined, and in addition a "desk" copy of the Score Card, to be retained by him and used as a key to facilitate scoring the pupils' responses.

[1] The author is indebted to Doctors Hartshorne and May of Teachers College, Columbia University, with whom he coöperated during the later stages of the work, for helpful criticisms and for an allotment from the funds of the Character Education Inquiry for clerical assistance.

Conducting the Examining

These directions have been developed by trial to insure that every child shall understand exactly what he is to do. All the questions likely to be encountered have been anticipated in the directions, but any sensible question asked by a child should be answered. Give the instructions slowly, clearly, and with serious interest, with the expectation that the pupils will respond to your own mood.

Distribute the blanks face up, saying: "Do nothing until I explain what you are to do."

As soon as the blanks are distributed, say: "Fill in the blanks at the top of the page (point to the lines). Write your whole name. Give your age in years and months. That is, tell how many years old you were on your last birthday and how many months ago that was. Write the grade you are in at school after the word 'Grade.' The date to-day is.....; write it after the word 'Date.'

"The next question asks whether you have spent two years in any grade. Answer 'Yes' or 'No.' If you have spent more than two years in any grade, write after the next question what grades these were.

"Question 5 asks whether you have skipped any grades. Answer 'Yes' or 'No.' If you have skipped any grades, write after the next question what grades these were.

"On the next line, insert the city and state of your home address.

"In question 7, state how many years you have lived in this town.

"Question 8 asks whether you attended school in any other towns. Answer 'Yes' or 'No.' If you have attended school in any other towns, name them on the dotted line.

"Then write the name of your school.

"Now read the first line below 'If you have brothers or sisters in this school, write their names and grades on these lines.' If you have, put the name of your brother or sister where it says 'name,' and the grade he or she is in where it says 'grade.' There is room for two names, in case you have more than one brother or sister in this school.

"In the following questions you will underline, that is, draw a line under, the correct answer to each question. Are you a boy or a girl? If a boy, underline the word 'boy.' If a girl, underline the word 'girl.' Is that clear?"

NOTE: In this and the following items, the examiner should make sure that the pupils understand how to make their answers; that is, by *drawing* a line under the right answer. Younger children who are not accustomed to tests often do the thing wrong.

Then say: "The next answers are at the right. If you are living at home with your parents, underline the word 'Yes.' If you are not living at home with your parents, underline the word 'No.'

"The next question asks whether you are living in the home of someone else, such as a relative, adopted parents, guardian. Give the right answer by underlining 'Yes' or 'No.' Or, are you living in an institution, such as a boarding school, an orphan asylum, or a home for children? Underline the right word. Of course, if you have answered either of the other two questions 'Yes,' the answer to this will be 'No.'"

When certain that the first page has been completed by all the pupils, say: "Now turn the page. Notice the questions. These questions are a good test of your ability to observe things around you. I will explain each question as we come to it. Be especially careful of your answers, and answer all of the questions. Use your own judgment in answering. Wait for instructions on each question. Don't ask me anything if you can help it.

1. "Now read the first question. It says: 'Have you a telephone in your home?', that is, at the place where you live? If you have a telephone, draw a line under 'Yes' at the right of the question. If you have no telephone, draw a line under 'No.' This means a private telephone which you can use whenever you want to. If the telephone which you have is a pay station (where you put a nickel in the slot), answer 'No.' Look at me as soon as you are ready for the next question.

2. "Is your home heated by a furnace in the basement? Draw a line under the right answer. Of course, if your home is heated by a stove or stoves or anything other than by a furnace, you will answer 'No.' Do you understand what you are to do?

"Look at me when you are ready for the next question.

3. "Do you have a bathroom that is used by your family alone? Underline the right answer. If you have a roomer living with you and he uses the bathroom, you may still answer 'Yes;' but if the bathroom is used by another family or you have no bathroom at all, answer 'No.'

4. "Do you have a bank account in your own name? This means an account in a city bank, not a school bank. If you have such an account, underline 'Yes;' if you have not, underline 'No.'

5. "Did your father go to college? Any college other than business college is counted. Underline either 'Yes' or 'No.'

6. "Did your mother go to college? Underline either 'Yes' or 'No.'

7. "Did your father go to high school? Underline. Any school above the grade school is considered as high school. Of course, if question 5 is answered 'Yes,' then question 7 will be 'Yes' also.

8. "Did your mother go to high school? Underline. If question 6 is answered 'Yes,' then question 8 is 'Yes' also."

The examiner will perhaps need to assist the pupils with these questions concerning education of the parents. In most cases where there is doubt, the answer is 'No.' Insist that the pupils give some answer. Ask them if they have heard their parents speak of going to a high school or academy. If they have not, the answer is usually 'No,' unless they went to college, when, of course, it is 'Yes.'

9. "Does your mother (or the lady of the home in which you live) regularly attend any lecture course of which you know? Underline either 'Yes' or 'No.' A lecture course is a number of talks given once a week or once every two weeks, in some church, or school, or hall, or home, and people go in to listen to them. This does not mean going to a regular church service.

10. "Do you have your own room in which to study? If you do not have a special place to study, but study in the room with the rest of the family, or wherever you happen to take a notion to study, then answer 'No.' If you have a room of your own or a room that you share with a brother or sister, then answer 'Yes.'

11. "Do you take private lessons in music? 'Private lessons' means that you or your folks have to pay for them. They may be lessons in piano, violin, singing, etc. Underline the right answer.

12. "Do you take private lessons in dancing? 'Private,' again, means lessons for which you or your folks have to pay. Underline the right answer.

13. "Does your mother belong to any clubs or organizations of which you know—for example, a sewing club, a card club, a church club, etc.? Underline 'Yes' and write the name of the club on the line below if you know of one to which your mother belongs. [Examiner will point out line, and see that children understand.] If you don't think she belongs to one, underline 'No.' If you think she belongs to one, but don't know the name of it, underline 'Yes' and leave the name out.

14. "Do you belong to any clubs or organizations where you have to pay dues? Underline 'Yes' or 'No,' and write the name or names of the clubs if you belong to any. Remember it says 'where you have to pay dues.' If you belong to some club or organization, but don't have to pay dues in it, then answer 'No.'

15. "Does your family (your father and mother) attend concerts? Concerts are musical programs, perhaps an organ recital, a band concert, an orchestra program, a program by a singer or a pianist. Underline the word 'Never' if you do not remember your parents going to such a concert. Underline 'Occasionally' if you can remember once or twice that they have gone to such a concert. Underline 'Frequently' if they go four or five times a year or oftener.

16. "Where do you regularly spend your summers? Underline the right answer. If you spend them at home, underline 'At Home.' If you usually go to the country (or living in the country, usually go to the city) for a visit or go to camp, to the mountains, to the shore, or any other place for a few weeks during the summer, then underline 'Away From Home.' Don't underline both places.

17. "How often do you have dental work done? 'Never' or 'When Needed' or 'Once a Year' or 'Oftener' than once a year? Underline only one of these. If the work is done by a school dentist, don't count that. The question means work done at a private dentist's where your father has to pay for it. If you have a regular time for having dental work done, whether or not you need it, having your teeth examined and perhaps cleaned, then underline the words which seem to tell how often you have this done. If you go to a dentist just when you need work done, that is, have a toothache, etc., then underline 'When Needed.' If you have never had any work done, underline 'Never.'

18. "How many servants, such as a cook, a housekeeper, a chauffeur, or a maid, do you have in your home? If there are any servants or people that work in your home for pay, underline the right number, for example, 'One Part-Time,' etc. If there are no servants, underline 'None.'

19. "Does your family own an auto which is not a truck? Underline the word that tells how many autos your family owns. If you do have an auto, write the make of the auto on the line where it says to write it.

20. "How many magazines are regularly taken in your home? 'Regularly' means that you get them through the mail or that they are delivered at regular intervals, such as once a week or once every two weeks. If you don't get any magazine regularly, then underline 'None.' If you get one or more, then underline the right number and write the names of one, two, or three of them on the lines under the question where it says to write them. Do the best you can at spelling them.

21. "About how many books are in your home? (Be very careful with this question. A row of books three feet long [examiner illustrate with hands] would not have more than 25 books in it.) If you have no books, then underscore 'None.' If all the books in your home would make a row about three feet long, underline where it says '1 to 25.' If you have a small bookcase full of books or several rows of books, underline where it says '26 to 125.' Perhaps you may have even more, a bookcase full and many more, or two bookcases full.

Underline where it says '126 to 500.' Or, it may be that you have a room at home where the walls are lined with books—a library. If you have, then perhaps you should underline where it says 'More,' that is, more than 500. Use your own judgment, but be very careful.

22. "How many rooms does your family occupy? That is, how many rooms are there in your house or apartment or tenement or flat which are used by your family and any persons who belong to your household? If you have relatives living with you, or have servants who sleep in your house, or if you rent one or more rooms to roomers, count in all their rooms also. Underline the total number of rooms. Bathrooms, closets, and pantries don't count. If you live in a two-family house, count only the rooms used by your own family and those living with you, that is, relatives, servants, and roomers.

"Next, how many persons occupy these rooms? Count all the members of your family, beginning with yourself, and any other persons—relatives, servants, roomers—that live in your home. Servants who come in by the day are not included. When you have counted, underline the right number.

23. "Write your father's occupation on this line. That is, your father's work. For example, he may be a doctor, a plumber, a barber, a carpenter, a keeper of a store, a salesman, a machinist, etc.

"If your father is not living, then write his occupation when he was living. However, if you have a step-father, you may write his occupation. Please don't omit this question. I want you to answer it. Ask questions if you are in doubt as to what to do."

(The examiner will assist pupils with this question. The object is to find out the occupation of the person who is making the living for the family. It is essential that the pupils answer it.)

"Does he own part, all, none, of his business? Draw a line under the word which answers the question. That is, if he owns part of his business, underline 'Part,' etc.

"Does he have any title, such as president, manager, foreman, boss, etc.? If he does have such a title, draw a line under the word 'Yes,' and write the title on the line where it says to write it. If he does not have a title that you know of, then underline 'No' and don't write anything.

"How many persons work for him? Draw a line under the right number. If none do, then draw a line under 'None.'

"Now take a few minutes to look over your questions. Be sure that you have answered all of them. Ask any questions that are necessary."

Before collecting the blanks the examiner should look them over, one by one, for omissions. By questioning the pupil it will often be

possible to supply the information lacking. Use all reasonable effort to get every question answered by every child as accurately as possible. A special interview should be sought to fill up blanks wherein *more than three* questions remain unanswered, otherwise the scoring plan is interfered with.

Scoring the Responses

Read all these directions before doing any scoring.

If more than one blank is to be scored, prepare a key by marking on an unused blank the credits which are assigned for each possible response. Keep the key-blank with this Manual of Directions for future use. It is a good plan to use red ink for inserting these credits, which are as follows:

Questions 1 to 14;[1] credit 3 for each 'Yes,' 0 for each 'No.'

Question 15: Never, 0; Occasionally, 3; Frequently, 3.

Question 16: At Home, 0; Away from Home, 3.

Question 17: Never, 0; When Needed, 0; Once a year, 3; Oftener, 3.

Question 18: None, 0; One Part Time, 3; One or More All the Time, 4.

Question 19:[1] None, 0; One, 3; Two or More, 4.

Question 20:[1] None, 0; One, 2; Two, 3; Three or More, 4.

Question 21: None, 0; 1 to 25, 2; 26 to 125, 4; 126 to 500, 5; More, 6.

Question 22: Insert on the margin of the key-blank the following correspondences between room-person ratio and units of credit:

Ratio	*Credit*
0.0 to 0.50	0
0.51 to 1.00	3
1.01 to 1.50	4
1.51 to 2.00	5
2.01 and up	6

To find the ratio, divide the number of rooms occupied by the number of persons occupying, carrying the quotient to one decimal place.[2] (Time will be saved by scoring Question 22 in all the blanks before proceeding to Question 23.)

[1] The supplementary question in Nos. 13, 14, 19, and 20 is introduced to make the child more careful in filling out the card; it is not scored, itself.

[2] In illustration, if 6 rooms are reported occupied by 8 persons, the ratio is 6/8, or 0.7, and is given 3 points credit.

Question 23: Insert on the margin of the key-blank the following correspondences between class of occupations and units of credit: Group I, credit 8; Group II, 6; Group III, 4; Group IV, 2; Group V, 0.

To classify the father's occupation into its proper group, consult the following lists, which should be clearly in mind before proceeding.

Classification of Occupations

Group I. Professional men, proprietors of large businesses, and higher executives. Typical occupations are illustrated:

Professional men like architects, artists, authors, clergymen, college administrators, dentists, editors of large papers, engineers (civil, electrical, mechanical), inventors, journalists, lawyers, physicians, teachers (college).

Important public officials, like senators, congressmen, mayors, postmasters of large towns.

Important private officials, like higher executives of large corporations.

Proprietors of businesses and managers employing more than 10 men and owning part or all of their business, like agents (insurance, real estate, railroad, steamship, etc.) large buyers, clothiers, large contractors, hotel owners and managers, manufacturers, merchants, publishers, etc.

Also bankers, brokers, inspectors (government and railroad, but not shop inspectors).

Group II. Commercial service, clerical service, large land owners, managerial service of a lower order than in Group I, and business proprietors employing from five to ten men.

Accountants, bookkeepers, cashiers, commercial travellers, large-scale farmers, high-school teachers, musicians, buying and selling agents (insurance, real estate, etc.) working for someone else, proprietors of businesses (clothiers, merchants, publishers, etc.) employing five to ten men, managers of small corporations, assistants in governmental employ, etc.

Group III. Artisan proprietors, petty officials, printing trades employees, skilled laborers with some managerial responsibility, shop owners and business proprietors employing one to five men.

Bakers, barbers, blacksmiths, cleaners and dyers, cobblers, machinists, plumbers, tailors, and other artisans owning their own business; clerks in stores, farmers, foremen, railroad conductors and engineers, shop inspectors, linotypers, detectives, mail clerks, police sergeants, fire captains, etc.

Group IV. Skilled laborers (with exception of printers), who work for someone else, building trades, transportation trades, manufacturing trades involving skilled labor, personal service. Small shop owners doing their own work.

Bakers, blacksmiths, cabinet-makers, carpenters, chefs, cooks, electricians, engineer's assistants, firemen, janitors, locksmiths, mailmen, policemen, tenants, tinsmiths, tanners, sailors, switchmen, waiters. Small shop owners employing no help.

Group V. Unskilled laborers, common laborers, helpers, "hands," peddlers, varied employment, venders, unemployed (unless it represents the leisured class or retired).

Bootblacks, drivers (truck and wagon), delivery men, fish peddlers, furnace tenders, night watchmen, suit pressers, messengers, and all common labor.

In classifying occupations be sure to consider the number of persons employed, titles, and whether or not the business is owned. That is, keep in mind the responses to all the questions of No. 23.

Record on the margin of the pupil's blank (using Roman numerals) the occupation group to which you judge his father belongs. By reference to the key-blank, record also on the pupil's blank (using Arabic numerals) the corresponding number of credits.

(Time will usually be saved by scoring Question 23 in all the blanks before proceeding further.)

A credit has now been assigned to each of the replies to the 23 questions that have been answered. Add these credits and enter the sum at the end of the blank as the total credits (T.C.)

Divide this sum by the actual number of questions answered. That is, if the child has answered all questions, divide by 23; if one question has been omitted, divide by 22, etc. (This is necessary to make provision for any questions unanswered.)

This quotient, carried to one decimal place and the decimal neglected, is the score, the *Socio-Economic Status.*

The accompanying table will facilitate the derivation of the score if as many as 20 questions are answered.[3]

The table is read as follows: The first column gives all possible total credits, the second column gives the score when 23 questions are answered, the third column gives the score when 22 questions are answered, etc.

Interpreting the Results: Levels of Socio-Economic Status

For comparative purposes it is necessary to have some idea of the significance of a given score. A numerical score as such means but little; it is only when compared with other scores within the group examined and with the scores of other groups that it comes to have meaning. Use of the word *status* implies relative position, and it is well to recognize the fact that the condition being measured is usually of significance in connection with the group within which the child lives. The questions may not have like significance in different communities. To possess all of the items called for in the Score Card may in one community indicate an extremely high socio-economic level, in another it may indicate but an average level. The status or condition being measured is very much a relative matter. For this reason comparisons are most reliable when made within the same or similar groups.

Even in this stage of its use, however, it is helpful to examiners to have before them a typical distribution of scores, so that they may

[3] If a fewer number are answered the blank should be returned to the examinee for completion.

Table for Converting Total Credits from 1 to 82 into Scores When 23, 22, 21, or 20 Questions Have Been Answered

T.C.	Questions Answered				T.C.	Questions Answered				T.C.	Questions Answered			
	23	22	21	20		23	22	21	20		23	22	21	20
1	0	0	0	1	28	12	13	13	14	56	24	25	27	28
2	1	1	1	1	29	13	13	14	15	57	25	26	27	29
3	1	1	1	2	30	13	14	14	15	58	25	26	28	29
4	2	2	2	2	31	13	14	15	16	59	26	27	28	30
5	2	2	2	3	32	14	15	15	16	60	26	27	29	30
6	3	3	3	3	33	14	15	16	17	61	27	28	29	31
7	3	3	3	4	34	15	15	16	17	62	27	28	30	31
8	3	4	4	4	35	15	16	17	18	63	27	29	30	32
9	4	4	4	5	36	16	16	17	18	64	28	29	30	32
10	4	4	5	5	37	16	17	18	19	65	28	30	31	33
11	5	5	5	6	38	17	17	18	19	66	29	30	31	33
12	5	5	6	6	39	17	18	19	20	67	29	30	32	34
13	6	6	6	7	40	17	18	19	20	68	30	31	32	34
14	6	6	7	7	41	18	19	20	21	69	30	31	33	35
15	7	7	7	8	42	18	19	20	21	70	30	32	33	35
16	7	7	8	8	43	19	20	20	22	71	31	32	34	36
17	7	8	8	9	44	19	20	21	22	72	31	33	34	36
18	8	8	9	9	45	20	20	21	23	73	32	33	35	37
19	8	9	9	10	46	20	21	22	23	74	32	34	35	37
20	9	9	10	10	47	20	21	22	24	75	33	34	36	..
21	9	10	10	11	48	21	22	23	24	76	33	35	36	..
22	10	10	10	11	49	21	22	23	25	77	33	35	37	..
23	10	10	11	12	50	22	23	24	25	78	34	35	..	..
24	10	11	11	12	51	22	23	24	26	79	34	36	..	..
25	11	11	12	13	52	23	24	25	26	80	35	36	..	..
26	11	12	12	13	53	23	24	25	27	81	35	..	..	..
27	12	12	13	14	54	23	25	26	27	82	36	..	..	..
					55	24	25	26	28					

know approximately what to consider a high, what to consider an average, what to consider a low score. For this purpose we present in tabular form the percentile rank and the descriptive interpretation attaching to various possible scores. These percentiles are based upon scores from a fairly unselected group of 686 sixth, seventh, and eighth-grade children from the schools of New Haven, Connecticut. Users of this Manual will understand that these percentiles and interpretations relate to conditions at New Haven; they should be considered as merely provisionally applicable elsewhere.

The table is read as follows: A score of 36 is the maximal possible score and represents an indeterminately high level (theoretically perfect) of socio-economic status; a score of 29.2 represents the 94.5 percentile and corresponds to the highest status found in the New Haven group; a score of 24.5 represents the 88.5 percentile and corresponds to a very high status; a score of 10 represents the 50 percentile and corresponds to a medium status within the group, etc. The numbers 1 to 10, preceding the descriptive levels, represent suggested ratings that might be used to designate strata of homes graded from 0 (no home at all) to 10 (theoretically perfect home).

Score	Corresponding Percentile	Suggested Rating	Corresponding Level of Socio-Economic Status
36	....	10	Indeterminately High
29.2	94.5	9	Highest
24.5	88.5	8	Very High
17.6	78.8	7	High
13.2	65.5	6	Medium High
10	50	5	Medium
7.5	34.5	4	Medium Low
5.1	21.2	3	Low
3.2	12.5	2	Very Low
1.8	5.5	1	Lowest
0.0	....	0	Indeterminately Low

REPORTS

Users of this Score Card will confer a favor upon the author the publisher and will assist in the perfecting of this device if t will report results to the publishers and also proffer constructive cr cisms for the improvement of the Score Card and the Manual of rections. Address all such reports to the Public School Publish Company, Bloomington, Illinois.

The following is taken from reports submitted.

City	*Population*	*Grades*	*Number of Cases*	*Aver Scor*
Alabama City, Ala.	8,000 (Mill town)	4-12	145	9.3
Bessemer, Ala.	25,000 (Industrial)	10-12	432	18.0
Northport, Ala.	3,000 (Country town)	6	56	14.0
Tuscaloosa County, Ala.	Rural (white)	6	365	11.3
Tuscaloosa County, Ala.	Rural (negro)	6	138	5.9
Tuscaloosa County, Ala.	Rural (white)	9-12	217	14.0
Tuscaloosa, Ala.	25,000 (College town)	4-6	313	16.8
New Haven, Conn.	190,000	6-8	638	13.6
Athens, Ga. (Univ. of Georgia, Demonstration School)	18,192 (75% rural 25% urban) (white)	7-11	184	15.05
Lake Charles, La.	22,000	6-7	300	16.1
Lincoln Parish, La.	Rural	5-11	600 (app.)	11.1
Ruston, La.	5,000 (College town)	5-11	400 (app.)	16.8
Baltimore, Md.	800,000	9-12 (Summer Students)	1216	18.95
New York City, N. Y.	Lincoln School	All		27.2
Stillwater, Okla.	7,000	8-9	243	18.5

METROPOLITAN ACHIEVEMENT TESTS

ADVANCED ARITHMETIC TEST: FORM R

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Adv. Arith.
R

Name.....Boy.....Girl.....

Teacher.....Grade.....School.....

City.....County.....State.....

TEST	STAND-ARD SCORE	GRADE EQUIVA-LENT	
1. Arithmetic Fundamentals			
2. Arithmetic Problems			
Average Arithmetic			

....
Year Month Day
Date of Testing

....
Year Month Day
Date of Birth

Age ..... yrs. ..... mos.

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a

TEST 1. ARITHMETIC FUNDAMENTALS

DIRECTIONS. Work each example and write the answer in the box near it. If you have to copy your answer, be sure to copy it correctly. *Reduce all improper fractions to mixed numbers, and all fractions to lowest terms.*

1. *Add*
$$\begin{array}{r} \$249.29 \\ .82 \\ 737.95 \\ 7.87 \\ 66.44 \end{array}$$

2. *Subtract*
$$\begin{array}{r} 771315 \\ 166428 \end{array}$$

3. *Multiply*
$$\begin{array}{r} 5627 \\ 94 \end{array}$$

4. $7)7947$

5. $32)704$

6. $49)24856$

7. *Add*
$$\begin{array}{r} \frac{2}{3} \\ \frac{1}{6} \end{array}$$

8. *Add*
$$\begin{array}{r} 5\frac{3}{8} \\ 2\frac{7}{8} \end{array}$$

9. $\frac{1}{2}+\frac{2}{5}+\frac{3}{4}=$

10. *Subtract*
$$\begin{array}{r} \frac{1}{2} \\ \frac{1}{8} \end{array}$$

11. *Subtract*
$$\begin{array}{r} 3\frac{7}{8} \\ \frac{1}{2} \end{array}$$

12. *Subtract*
$$\begin{array}{r} 4\frac{1}{4} \\ \frac{2}{3} \end{array}$$

(Go right on to the next page.)

13. $\frac{3}{5}\times\frac{5}{12}=$

14. $12\times 2\frac{3}{4}=$

15. $6\frac{1}{4}\times 8\times 2\frac{2}{5}=$

16. $12\div\frac{3}{4}=$

17. $\frac{2}{3}\div\frac{5}{6}=$

18. $\frac{3}{5}\div 12=$

19. $5\frac{1}{3}\div 1\frac{1}{6}=$

20. *Add*
$$\begin{array}{r} .241 \\ 85.006 \\ 235.054 \\ .745 \\ 26.012 \\ 9.327 \end{array}$$

21. $\$78-\$3.11=$ $

22. $\frac{3}{4}+.035=$

23. $100\times .066=$

24. $.24\times 52.4=$

25. $6).42$

26. $.004).0368$

27. $1.26)88.2$

(Go right on to the next page.)

28. 5% of 300 = ____

29. $\frac{2}{3}$ = ____ %

30. 60% of 24 = ____

31. 300% of 120 = ____

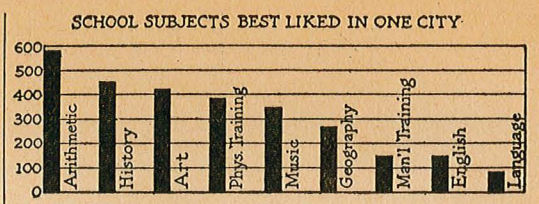
32. $37\frac{1}{2}$% of 24 = ____

33. 16 is what per cent of 64? ____ %

34. What per cent of 24 is 9? ____ %

35. $\frac{1}{8}$% of 1600 = ____

36. 45 is 30% of what? ____



37. About how many pupils liked physical training best? ____

38. 2 yr. 9 mo. = ____ yr.

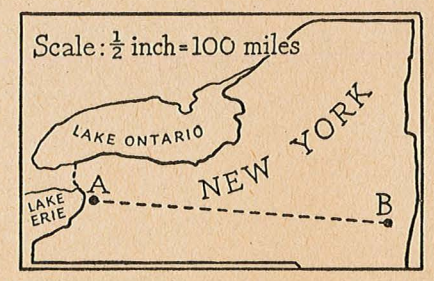
39. 3 sq. yd. = ____ sq. ft.

40. *Add*

2 ft. 4 in.
3 ft. 8 in.
4 ft. 6 in.

____

41. The ratio of a foot to a yard is —— ____ to ____



42. The distance on above map from *A* to *B* is $1\frac{1}{2}$ in. According to the given scale what is distance in miles? ____ mi.

(*Go right on to the next page.*)

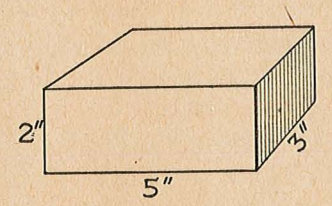
43. Find the average of 4, 8, 12, 16, 20, 24. ____

44. Principal = $750
Rate = 3%
Time = 3 yr.
Interest = —— $ ____

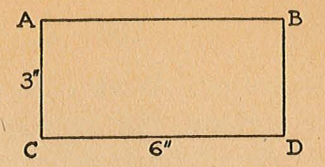
45. Selling price = $2,500
Rate of commission = 18%
Commission = —— $ ____

46. Principal = $500
Time = 1 yr. 4 mo.
Rate = 6%
Interest = —— $ ____

47–48. Principal = $600
Rate = 4%
Time = 60 da.
Interest —— $ ____
Amount —— $ ____



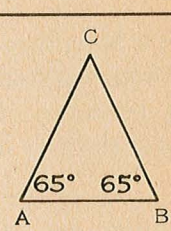
49. The volume of the above figure is —— ____ cu. in.



50. The figure above is called a —— ____

51. Its area is —— ____ sq. in.

52. The letters of two parallel lines are ____ and ____



53. How many degrees in angle *C*? ____ °

54. What kind of angle is angle *A*? ____

55. $x + 27 = 49$ ____ x =

56. $\frac{x}{3} = 5$ ____ x =

57. $\sqrt{81}$ = ____

STOP!

No. right..... *Stand. score*..... *Gr. equiv*..... *Age equiv*.....

TEST 2. ARITHMETIC PROBLEMS

DIRECTIONS. Work each problem and write the answer in the box after the problem. Do your work in the margin at the right of the page.

1. Rose had a piece of ribbon $3\frac{7}{8}$ yards long. She had $1\frac{1}{4}$ yards left after making bows. How many yards did she use for the bows? [yd.] 1

2. Mr. Lane bought a new flagpole for his front yard. It is $28\frac{7}{8}$ feet long. If he puts it $4\frac{1}{2}$ feet into the ground, how many feet of the pole will be above ground?..... [ft.] 2

3. Mrs. Doyle bought two chickens for dinner. One chicken weighed $3\frac{1}{2}$ pounds and the other $2\frac{3}{4}$ pounds. How many pounds of chicken did she buy in all?..... [lb.] 3

4. Emil's father got 20 baskets of berries. He said he would give a fourth of them to his brother and a fourth to a neighbor and keep the rest. How many baskets was he going to keep?..... [ ] 4

5. Ned bought $\frac{1}{2}$ dozen roses for $1.68. At that price what did one rose cost him?... [¢] 5

6. How much material should Louise buy for 6 towels, each of which is to be $\frac{7}{8}$ yard long? [yd.] 6

7. If a map is drawn to a scale of 100 miles to $\frac{1}{4}$ inch, what distance will be represented by a line $1\frac{1}{2}$ inches long?..... [mi.] 7

8. Mr. Nelson bought a table for $12.75. He paid $1.50 to have it carted to his shop. He spent $1.69 to repaint it. He sold it for $20.00. How much did he gain on it? [$] 8

9. Susan has $3\frac{1}{2}$ yards of ribbon that she wants to cut into $\frac{1}{4}$-yard lengths. How many lengths can she cut?..... [ ] 9

10. My father is paid twice a month. If each check is $75, how much does he get a year? [$] 10

 (Go right on to the next page.)

11. Nancy had the following marks in her mid-term tests: 92, 68, 84, 74, and 100. What was her average mark?..... [ ] 11

12. Our class bought a box of 2 dozen candy bars for 95¢ and sold the bars for 5¢ each. How much did we make on a box?..... [¢] 12

13. Sol earns 40¢ an hour. Yesterday he worked from 8:30 to 11:00 and from 2:30 to 3:30. How much did he earn?... [$] 13

14. Ruth needs 200 ice-cream cones for the church fair. If a quart of ice cream fills 10 cones, how many gallons of ice cream should she order?..... [gal.] 14

15. The speedometer showed 2014.9 miles when we started on our trip and 2030.8 when we finished. How many miles did we travel?.. [mi.] 15

16. Mrs. Combs pays $200 down and $10 a week for a 550-dollar piano. How long will it take her to pay for it?..... [wk.] 16

17. On different days last week, Rose's sister worked $5\frac{1}{2}$ hours, 8 hours, and $6\frac{3}{4}$ hours. If she was paid 48¢ an hour, how much did she receive for her work last week?.... [$] 17

18. What will ice cream for 224 persons cost if you allow 1 quart of ice cream for 8 persons and pay $2.00 a gallon for it?..... [$] 18

19. Bertha has a 6-yard piece of lace. She gave $1\frac{3}{4}$ yards to her sister for a dress and used $\frac{7}{8}$ of a yard on her own dress. How much did she have left?..... [yd.] 19

20. Polly bought $\frac{3}{4}$ yard of ribbon at 40¢ a yard and $\frac{2}{3}$ yard of silk at $1.68 a yard. How much was the bill?..... [$] 20

21. On Ruth's bar graph 1 inch represents a river 2000 miles long. How long would the bar be for a river 2500 miles long?.... [in.] 21

22. At our field day 65% of the 1000 pupils took part. 20% of those who took part won prizes. How many received prizes?.. [ ] 22

23. Nan is making 3 doll's dresses of the same size from a 2-yard piece of cloth. What part of a yard will she use for each doll?... [yd.] 23

 (Go right on to the next page.)

24. Lena's sister earns $32 a week. Every Monday she puts $4 in the bank. What per cent of her money does she save?..... [%] 24

25. How much would $4\frac{3}{4}$ pounds of salted nuts cost at $1.50 a pound?..... [$] 25

26. A radio which cost $50 was sold for $60. The overhead on the radio was 30% of the first cost. How much money was lost on the sale ? [$] 26

27. Laura painted the kitchen floor, which is 18 feet by 12 feet. How much did the painting cost at 12¢ a square foot?..... [$] 27

28. The city tax rate is $2.72 per $100 of assessed value. What does Mr. Smith pay on his house assessed at $9500?..... [$] 28

29. Mr. Hall borrowed $850 for 90 days at 4%. How much interest did he owe then?..... [$] 29

30. Our motorboat ran a distance of 19.8 miles in 1.2 hours. Find its rate of speed per hour..... [mi.] 30

31. Find the annual premium on a 20-year life insurance policy if the rate is $47.80 per $1000 and the face of the policy is $6000. [$] 31

32. Mr. Astor shipped 115 barrels of apples to his agent, who sold them at an average price of $4 a barrel. He charged 5% commission. Other expenses came to $24. What were Mr. Astor's net proceeds?..... [$] 32

33. Mr. Rob borrowed $1600 to start a grocery store. After 15 months he paid the loan, with interest at 5%. What sum did he pay? [$] 33

STOP!

No. right..... *Stand. score*..... *Gr. equiv*..... *Age equiv.*